IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
HEINZ EICHBERGER et al.

Application No.: 10/566,033 Confirmation No.: 9411

Filed: July 14, 2006 Art Unit: 3742

For: METHOD OF CHARGING FINE-GRAINED METALS INTO AN ELECTRIC-ARC FURNACE Examiner: Q. T. Van

APPEAL BRIEF

MS Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

November 2, 2009

Dear Sir:

Appellants submit this Appeal Brief in accordance with 37 C.F.R. § 41.37 in support of their appeal from the Final Office Action, mailed June 2, 2009 by Examiner Quang T. Van, and the Advisory Action, mailed August 17, 2009, in the above-identified patent application.

In accordance with 37 C.F.R. §§ 41.31 and 41.37, this Appeal Brief follows the September 1, 2009 filing of a Notice of Appeal and payment of the required fee. Appellants submit that this Appeal Brief is timely filed within two months of the September 1, 2009 Notice of Appeal, is in furtherance of said Notice of Appeal, and is accompanied by the required fee. The filing of this Appeal Brief requires no extension of time fee. However, the Commissioner is hereby authorized to charge any unpaid fees deemed required in connection with this Appeal Brief, or to credit any overpayment, to Deposit Account No. 04-0100.

The fees required under 37 C.F.R § 41.20(b)(2) are also dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.2:

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Outotec OYJ.

The inventors assigned all their respective rights in and to this application to Otokumpu Technology Oy, as recorded under Reel/Frame 017934/0496 on July 14, 2006. Otokumpu Technology Oy changed its name to Outokumpu Technology OYJ, which name change was recorded under Reel/Frame 022540/0988 on April 14, 2009. Outokumpu Technology OYJ changed its name to Outotec OYJ, which name change was recorded under Reel/Frame 022541/0217 on April 14, 2009.

II. RELATED APPEALS AND INTERFERENCES

To Appellants' knowledge, there are no other appeals, interferences or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

Claims 1-26 are pending in the present application.

B. Current Status of Claims

1. Claims canceled: none
2. Claims withdrawn from consideration but not canceled: none
3. Claims pending: 1-26
4. Claims allowed: none
5. Claims rejected: 1-26

C. Claims On Appeal

The claims on appeal are claims 1-26

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the mailing of the June 2, 2009 Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a method of charging fine-grained metal, metal compounds or a mixture of two or more metals or metal compounds, in particular fine-grained directly reduced iron, into an electric-arc furnace, in which the metal, the metal compound or the mixture is supplied

essentially continuously via at least one downpipe to one or more openings provided in the furnace roof, is introduced into the furnace through said at least one opening as a stream of bulk material, and falls onto the melt merely by gravity, as well as to an electric-arc furnace which is suited in particular for performing the above-mentioned method (Specification, page 1, lines 714). The present invention also relates to an electric-arc furnace which can be charged in accordance with the method and has a furnace roof with at least one charging hole, the charging hole being connected with a downpipe for supplying the metal, and a dosing orifice being provided at the outlet of the downpipe (Specification, page 5, lines 14-16).

Independent claim 1 recites "a method of charging a bulk material including fine-grained metal, metal compounds or a mixture of two or more metals or metal compounds, into an electric-arc furnace," (Specification, page 1, lines 7-9), and recites the steps of the bulk material being "supplied essentially continuously via at least one downpipe to one or more openings provided in the furnace roof, is introduced into the furnace through said at least one opening as a bulk material stream, and falls onto the melt merely by gravity," (Specification, page 1, lines 7-13, Fig. 1 where 12 is the downpipe, 5 is an opening, 4 is the furnace roof, 1 is the furnace, 11 is the bulk material stream and 13 is the melt), "wherein before entering the furnace after the downpipe," (Abstract, Specification, page 3, line 4, page 11, lines 10-11, Fig. 1 where 1 is the furnace and 12 is the downpipe), "the bulk material stream is passed through a dosing orifice," (Specification, page 3, line 4, page 11, lines 10-11, Fig. 1 where 11 is the bulk material stream and 8 is the dosing orifice), "to control a material flow rate so as to maintain at least a portion of the downpipe filled with the bulk material so that the bulk material stream enters the furnace essentially undisturbed," (Specification, page 3, line 7, lines 13-15, page 7, lines 20-22, Fig. 1 where 12 is the downpipe, 11 is the bulk material stream and 1 is the furnace), "so that the bulk material stream is not substantially enlarged during the fall onto the melt" (Specification, page 3, lines 17-20, Fig. 1 where 12 is the bulk material stream and 13 is the melt).

Independent claim 10 recites "an electric-arc furnace for charging with fine-grained directly reduced iron or ores," (Specification, page 1, lines 7-9, page 5, lines 14-15), and recites the features of "a furnace roof having at least one opening," (Specification, page 1, lines 9-11, page 5, lines 14-16, page 12, lines 11-12), "the at least one opening of the furnace roof being connected with a

downpipe leading to the furnace lid from outside for supplying the material to be charged," (Specification, page 5, lines 16-17, page 12, lines 12-14), "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace is provided" (Specification, page 4, lines 11-15, page 5, lines 16-17, page 6, lines 27-29, page 7, lines 1-2, page 12, lines 14-16).

Independent claim 22 recites "a method of charging a bulk material including fine-grained metal, metal compounds or a mixture of two or more metals or metal compounds, into an electric-arc furnace," (Specification, page 1, lines 7-9), and recites the steps of the bulk material being "supplied essentially continuously via at least one downpipe to one or more openings provided in the furnace roof, is introduced into the furnace through said at least one opening as a bulk material stream, and falls onto the melt merely by gravity," (Specification, page 1, lines 7-13, Fig. 1 where 12 is the downpipe, 5 is an opening, 4 is the furnace roof, 1 is the furnace, 11 is the bulk material stream and 13 is the melt), "wherein before entering the furnace after the downpipe," (Abstract, Specification, page 3, line 4, page 11, lines 10-11, Fig. 1 where 1 is the furnace and 12 is the downpipe), "the bulk material stream is passed through an adjustable dosing orifice," (Specification, page 3, line 4, lines 25-26, page 5, lines 19-20, page 6, lines 31-33, page 11, lines 10-11, Fig. 1 where 11 is the bulk material stream and 8 is the dosing orifice), "to control a material flow rate so as to maintain at least a portion of the downpipe filled with the bulk material so that the bulk material stream enters the furnace essentially undisturbed," (Specification, page 3, line 7, lines 13-15, page 7, lines 20-22, Fig. 1 where 12 is the downpipe, 11 is the bulk material stream and 1 is the furnace), "so that the bulk material stream is not substantially enlarged during the fall onto the melt" (Specification, page 3, lines 17-20, Fig. 1 where 11 is the bulk material stream, and 13 is the melt).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1-2, 4-8, 10, 13, 15, 17 and 20-26 can properly be rejected as obvious under 35 U.S.C. § 103(a) on a combination of U.S. Patent No. 6,477,195 to Mittag et al ("Mittag") in view of U.S. Patent Application to No. 3,258,328 to Goss et al ("Goss").

2. Whether claims 10, 13-19 and 20-21 can be properly rejected as obvious under 35 U.S.C. § 103(a) on a combination of U.S. Patent No. 3,634,592 to Pantke et al ("Pantke") in view of Goss.

3. Whether claim 9 can be properly rejected as obvious under 35 U.S.C. § 103(a) on a combination of Mittag in view of Goss.

4. Whether claims 3 and 11-12 can be properly rejected as obvious under 35 U.S.C. § 103(a) on a combination of Mittag in view of Goss and further in view of U.S. Patent No. 3,379,426 to Reuter et al ("Reuter").

5. Whether claim 11 can be properly be rejected as obvious under 35 U.S.C. § 103(a) on a combination of Pantke in view of Goss and further in view of Reuter.

VII. ARGUMENT

Grounds of Rejection No. 1: Obvious rejection of claims 1-2, 4-8, 10, 13, 15, 17 and 20-26 based on a combination of Mittag and Goss

Mittag describes a process for melting down sponge iron where sponge iron 11 in lumpy form as pellets and/or briquettes and optionally, partly in the form of fines, is conducted into an electric-arc furnace 1 via chutes or slides 12. See Mittag, column 3, lines 42-46. When falling onto a slag layer 8 near an electrode 6 inside the electric-arc-furnace, the falling sponge iron 15 forms the shape of a cone envelope. See Mittag, column 3, column 4, lines 48-50 and Figs. 1-6. It is furthermore essential that oxygen for decarburination blown into the reactor 1 by oxygen lances 13 onto the slag layer 8 are shielded from the electrode 6 by the falling sponge iron 15. See Mittag, column 2, lines 26-34, column 3, lines 56-64, column 4, lines 22-24, 30-34 and 52-55 and Figs 1-6.

Goss describes an apparatus for treating steel where deoxidizers, desulfurizing agents and purification agents are contained in a hopper 19 equipped with a chute 18 with an adjustable gate 23

attached to the hopper 19 arranged so as to cause a measured quantity of addition agents to fall continuously upon the point of entry of the molten metal stream into the molten metal 16 in the tap ladle 17. See Goss, column 2, lines 47-60 and Fig. 1. The chute 18 is adjusted so that the flux 21 will hit the surface of the molten slag 14 and join the stream of molten metal at the same point 22 on the surface of the molten metal 15 so as to be thoroughly mixed. See Goss, column 3, lines 3-8 and Fig. 1.

Independent claims 1 and 22 of the present application both recite a method in which a bulk material stream is passed through a dosing orifice to control a material flow rate so that "the bulk material stream enters the furnace essentially undisturbed" and that "the bulk material stream is not substantially enlarged during the fall onto the melt."

It is respectfully submitted that Mittag fails to disclose at least the features that "the bulk material stream enter the furnace essentially undisturbed" and that "the bulk material stream is not substantially enlarged during the fall onto the melt," as recited in claims 1 and 22. In contrast, the sponge iron jet 15 between electrode 6 and oxygen jet 14 of Mittag is spread out and not "undisturbed" as required by claims 1 and 22 of the present application. Mittag describes as being "essential to the invention" that sponge iron jet 15 forms "a protective shield" which prevents immediate contact of the oxygen blown in with electrode 6. See Mittag, column 3, lines 56-64. Even where the sponge iron jet 15 of Mittag is arranged vertically and centrally in a free fall, said falling sponge iron jet 15 forms, with its periphery in the form of a cone envelope, "a protective shield" between oxygen jets 14 of oxygen lances 13 and a part of electrodes 6. See Mittag, column 4, lines 35-55. Nor is the sponge iron jet 15 or Mittag "not substantially enlarged during the fall onto the melt," as required by claims 1 and 22. In contrast, Mittag describes that that the falling sponge iron 15 is substantially enlarged by forming in its periphery a "cone envelope" when falling. See Mittag, column 4, lines 48-52. This significant enlargement of the falling sponge iron is also clearly depicted as 15, the falling sponge iron jet, in Figs. 1-6. Goss does not cure these defects. In contrast, Goss specifically adjusts chute 18 so that the flux 21 is thoroughly mixed with the molten metal 16. See Goss, column 3, lines 3-8 and Fig. 1. Nor does Goss contain any teaching that the bulk material stream is not substantially enlarged during the fall onto the melt, as recited in claims 1

and 22. In contrast, Fig. 1 of Goss clearly shows an enlargement of the flux 21 falling onto molten melt 16.

Because each of Mittag and Goss fails to teach or suggest at least the above-recited features of claims 1 and 22, it is respectfully submitted that any combination of these references, to the extent proper, could not render either of claims 1 or 22, or any of their respective dependent claims, obvious.

Independent claim 10 of the present application recites an electric-arc furnace having "a furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace."

It is respectfully submitted that neither of Mittag or Goss teach or suggest "a furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace" as is recited in claim 10. As noted by the Examiner, Mittag does not teach a dosing orifice. See Office Action dated June 2, 2009, Detailed Action, page 2, last line to page 3, line 2 and the Advisory Action dated August 17, 2009, lines 10-11. Goss does not cure this defect. In contrast, Goss describes an adjustable gate 23/hopper 19/chute 18 arrangement which is not connected to the tap ladle 17, and where tap ladle 17 also lacks a furnace roof and is filled with metal tapped from the furnace 11 through spout 12. See Goss, Fig. 1. The gate 23 is furthermore provided between the hoper 19 and the chute 18 and not at the opening of the chute 18 into the tap ladle 17, much less at an opening of the chute 18 into the furnace 11 as is required by claim 10 of the present application. Goss therefore does not teach or suggest a furnace roof connected with a downpipe wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace as is recited in claim 10.

Because each of Mittag and Goss fails to teach or suggest at least the above-recited features of claim 10, any combination of these references, to the extent proper, could not render claim 10, or any of its dependent claims, obvious.

Accordingly, it is respectfully submitted that claims 1-2, 4-8, 10, 13, 15, 17 and 20-26 are patentable over a combination of Mittag and Goss.

Grounds of Rejection No. 2: Obvious rejection of claims 10, 13-19 and 20-21 based on a combination of Pantke and Goss

Pantke describes a system for charging sponge iron into an electric arc furnace where a charging arrangement 5, 6 and 10 continuously introduces sponge iron into a furnace 1. See Pantke, column 4, lines 52-54 and Fig. 1. The charging arrangement 5, 6 and 10 lead the sponge iron via chutes 11a and 12a to the charging openings/risers 4 which carry funnels 4a at their upper ends. See Pantke, column 4, lines 47-50, column 5, lines 21-24 and Fig. 1.

Goss was described above.

Independent claim 10 of the present application recites an electric-arc furnace having "a furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace."

It is respectfully submitted that none of Pantke or Goss teach or suggest "a furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace," as recited in claim 10. In contrast, Pantke, merely describes charging openings/risers 4 which carry funnels 4a at their upper ends at the opening of the downpipe. See Pantke, column 4, lines 49-50 and Fig. 1. Moreover, the charging arrangement 5, 6 and 10 in Pantke is not located at the opening of the downpipe into the furnace; it is located above the funnels 4a. See Pantke, column 4, lines 44-54 and Fig. 1. Pantke therefore does not teach or suggest "a furnace roof being connected with a downpipe" "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace" as is recited in claim 10. Goss does not cure this defect. In contrast, Goss describes an adjustable gate 23/hopper 19/chute 18 arrangement which is not connected to the tap ladle 17, and where tap ladle 17 also lacks a furnace roof and is filled with metal tapped from the furnace 11 through spout 12. See Goss, Fig. 1. The gate 23 is furthermore provided between the hoper 19 and the chute 18 and not at the opening of the chute 18 into the tap ladle 17, much less at an opening of the chute 18 into the furnace 11 as is required by claim 10 of the present application. Goss therefore also does not teach or suggest "a furnace roof being connected with a downpipe" "wherein at an opening of the downpipe into the

furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace" as is recited in claim 10.

Because each of Pantke and Goss fails to teach or suggest at least the above-recited features of claim 10, any combination of these references, to the extent proper, could not render claim 10, or any of its dependent claims, obvious. Accordingly, it is respectfully submitted that claims 10, 13-19 and 20-21 are patentable over a combination of Pantke and Goss.

Grounds of Rejection No. 3: Obvious rejection of claim 9 based on a combination of Mittag in view of Goss

Mittag and Goss were described above.

It is respectfully submitted that claim 9 properly depends from independent claim 1. As stated above, none of Mittag or Goss disclose the features that "the bulk material stream enters the furnace essentially undisturbed" and that "the bulk material stream is not substantially enlarged during the fall onto the melt," as recited in claim 1.

Because each of Mittag and Goss fails to teach or suggest at least the above-recited features of claim 1, any combination of these references, to the extent proper, could not render claim 1, or dependant claim 9, obvious. Accordingly, it is respectfully submitted that claim 9 is patentable over a combination of Mittag and Goss.

Grounds of Rejection No. 4: Obvious rejection of claims 3 and 11-12 based on a combination of Mittag in view of Goss and further in view of Reuter

Mittag and Goss were described above.

Reuter describes a suction device for removing furnace gasses and ambient air from an electric arc furnace. See Reuter, column 1, lines 15-21 and column 3, lines 39-40.

It is respectfully submitted that claim 3 properly depends from independent claim 1. As stated above, none of Mittag or Goss disclose the features that "the bulk material stream enter the furnace essentially undisturbed" and that "the bulk material stream is not substantially enlarged

during the fall onto the melt," as recited in claim 1. Nor do Mittag or Goss suggest these features. Nor does Reuter cure this defect. In contrast, Reuter describes two different types of shutters 60 and 61 which can be placed onto a nozzle 59 to meter the amount of gas and ambient air sucked into the nozzle from the electric-arc-furnace 1. See Reuter, column 3, lines 39-40, column 4, lines 46-55 and Figs. 12-14. Reuter therefore does not teach or suggest the features that "the bulk material stream enter the furnace essentially undisturbed" and that "the bulk material stream is not substantially enlarged during the fall onto the melt," as recited in claim 1.

Therefore, a combination of Mittag and Goss with Reuter, to the extent proper, could not render claim 1 or its dependent claim 3 obvious. Accordingly, it is respectfully submitted that claim 3 is patentable over a combination of Mittag, Goss and Reuter.

It is respectfully submitted that claims 11 and 12 properly depend from independent claim 10. As stated above, none of Mittag or Goss disclose an electric-arc furnace having "a furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace." Nor do Mittag or Goss suggest these features. Nor does Reuter cure this defect. In contrast, Reuter describes two different types of shutters 60 and 61 which can be placed onto a nozzle 59 to meter the amount of gas and ambient air sucked into the nozzle from the electric-arc-furnace 1. See Reuter, column 3, lines 39-40, column 4, lines 46-55 and Figs. 12-14. The various figures of Reuter moreover clearly show that the suction device is not connected with the furnace roof. See Reuter, Figs. 1, 3, 5-6, 8-9 and 11-12. Reuter therefore does not teach or suggest "a furnace roof being connected with a downpipe" "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace" as is recited in claim 10.

Therefore, a combination of Mittag and Goss with Reuter, to the extent proper, could not render claim 10 or its dependent claims 11 and 12 obvious. Accordingly, it is respectfully submitted that claims 11-12 are patentable over a combination of Mittag, Goss and Reuter.

Grounds of Rejection No. 5: Obvious rejection of claim 11 based on a combination of Pantke in view of Goss and further in view of Reuter

Pantke, Goss and Reuter were described above.

It is respectfully submitted that claim 11 properly depends from independent claim 10. As stated above, none of Pantke or Goss teach or suggest a "furnace roof being connected with a downpipe," "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace," as recited in claim 10. Nor do Pantke or Goss suggest these features. Nor does Reuter cure this defect. In contrast, Reuter describes two different types of shutters 60 and 61 which can be placed onto a nozzle 59 to meter the amount of gas and ambient air sucked into the nozzle from the electric-arc-furnace 1. See Reuter, column 3, lines 39-40, column 4, lines 46-55 and Figs. 12-14. The various figures of Reuter moreover clearly show that the suction device is not connected with the furnace roof. See Reuter, Figs. 1, 3, 5-6, 8-9 and 11-12. Reuter therefore does not teach or suggest "a furnace roof being connected with a downpipe" "wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace," as recited in claim 10.

Therefore, a combination of Pantke and Goss with Reuter, to the extent proper, could not render claim 10 or its dependent claim 11 obvious. Accordingly, it is respectfully submitted that claim 11 is patentable over a combination of Pantke, Goss and Reuter.

VIII. CLAIMS

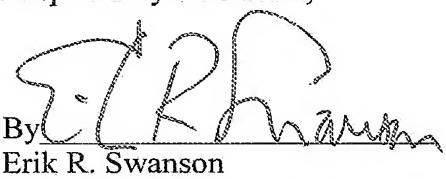
A copy of the claims involved in the present appeal is attached hereto as **Appendix A**.

CONCLUSION

For all of the reasons set forth above, the rejections of claims 1-26 should be reversed. Appellants respectfully request that the rejections be withdrawn, and the case passed to allowance.

Dated: November 2, 2009

Respectfully submitted,

By 

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Attachments: Appendices A, B, and C

APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/566,033

Claim 1 (Previously Presented): A method of charging a bulk material including fine-grained metal, metal compounds or a mixture of two or more metals or metal compounds, into an electric-arc furnace, in which the bulk material is supplied essentially continuously via at least one downpipe to one or more openings provided in the furnace roof, is introduced into the furnace through said at least one opening as a bulk material stream, and falls onto the melt merely by gravity, wherein before entering the furnace after the downpipe the bulk material stream is passed through a dosing orifice to control a material flow rate so as to maintain at least a portion of the downpipe filled with the bulk material so that the bulk material stream enters the furnace essentially undisturbed, so that the bulk material stream is not substantially enlarged during the fall onto the melt.

Claim 2 (Previously Presented): The method as claimed in claim 1, wherein after the downpipe the bulk material stream is passed through a round or oval dosing orifice.

Claim 3 (Previously Presented): The method as claimed in claim 1, wherein after the downpipe the bulk material stream is passed through an iris.

Claim 4 (Previously Presented): The method as claimed in claim 1, wherein the dosing orifice is inclined by not more than 25° with respect to the horizontal.

Claim 5 (Previously Presented): The method as claimed in claim 1, wherein the dosing orifice is arranged horizontally.

Claim 6 (Previously Presented): The method as claimed in claim 1, wherein the mass flow of the bulk material stream in the downpipe is kept larger than the throughput through the dosing orifice.

Claim 7 (Previously Presented): The method as claimed in claim 1, wherein after the dosing orifice the bulk material stream is passed through a protective tube.

Claim 8 (Previously Presented): The method as claimed in claim 7, wherein the protective tube is cooled.

Claim 9 (Previously Presented): The method as claimed in claim 1, wherein the metal, metal compound or mixture of two or more metals or metal compounds introduced into the furnace has a mean grain size of less than 1 mm.

Claim 10 (Previously Presented): An electric-arc furnace for charging with fine-grained directly reduced iron or ores, comprising a furnace roof having at least one opening, the at least one opening of the furnace roof being connected with a downpipe leading to the furnace lid from outside for supplying the material to be charged, wherein at an opening of the downpipe into the furnace an adjustable dosing orifice is configured to control a flow of the material into the furnace is provided.

Claim 11 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the dosing orifice is an iris.

Claim 12 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the dosing orifice has at least two slides movable with respect to each other.

Claim 13 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the dosing orifice is inclined with respect to the horizontal by not more than 25°.

Claim 14 (Previously Presented) The electric-arc furnace as claimed in claim 10, wherein the dosing orifice is arranged horizontally.

Claim 15 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the bulk recipient vessel constitutes a mass flow silo.

Claim 16 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the downpipe is arranged vertically.

Claim 17 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein below the dosing orifice a preferably vertical protective tube is provided.

Claim 18 (Previously Presented): The electric-arc furnace as claimed in claim 17, wherein the length of the protective tube is about 1 to 3 times the maximum diameter of the stream of bulk material.

Claim 19 (Previously Presented): The electric-arc furnace as claimed in claim 17 wherein the protective tube is cooled.

Claim 20 (Previously Presented): The electric-arc furnace as claimed in claim 17, wherein the diameter of the protective tube is at least twice as large as the opening diameter of the dosing orifice.

Claim 21 (Previously Presented): The electric-arc furnace as claimed in claim 10, wherein the maximum opening diameter of the dosing orifice is smaller than or equal to the diameter of the downpipe.

Claim 22 (Previously Presented): A method of charging a bulk material including fine-grained metal, metal compounds or a mixture of two or more metals or metal compounds, into an electric-

arc furnace, in which the bulk material is supplied essentially continuously via at least one downpipe to one or more openings provided in the furnace roof, is introduced into the furnace through said at least one opening as a bulk material stream, and falls onto the melt merely by gravity, wherein before entering the furnace after the downpipe the bulk material stream is passed through an adjustable dosing orifice to control a material flow rate so as to maintain at least a portion of the downpipe filled with the bulk material so that the bulk material stream enters the furnace essentially undisturbed, so that the bulk material stream is not substantially enlarged during the fall onto the melt.

Claim 23 (Previously Presented): The method as recited in claim 22, wherein the adjustable dosing orifice is round or oval.

Claim 24 (Previously Presented): The method as claimed in claim 22, wherein the adjustable dosing orifice is an iris.

Claim 25 (Previously Presented): The method as claimed in claim 22, wherein the adjustable dosing orifice is inclined by not more than 25° with respect to the horizontal.

Claim 26 (Previously Presented): The method as claimed in claim 22, wherein the adjustable dosing orifice is arranged horizontally.

APPENDIX B

No evidence pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

APPENDIX C

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.